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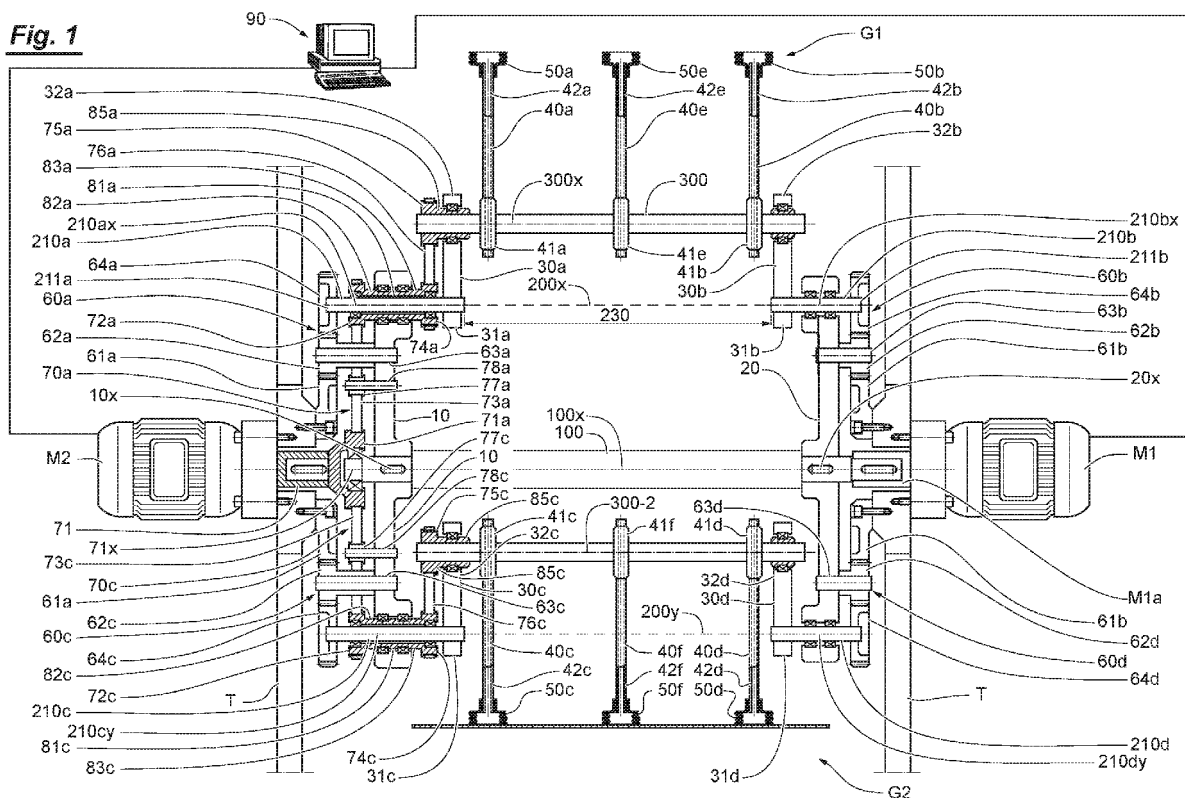
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(54) **Rotating system to withdraw, transport and supply blanks**

(57) -A rotating system to withdraw, to transport and to feed blanks comprising: -two rotating elements (10, 20); -a first solar shaft (100); -a first planetary shaft (210a) and a second planetary shaft (210b) disposed coaxial among them (200x); -two first arms (30a, 30b); -a third lunar shaft (300); -one or more second arms (40a, 40e,

40b); -one or more gripper means (50a, 50e, 50b); -first transmission means (60a-60b) able to rotate said first and said second planetary shafts (210a, 210b); -second transmission means (70a) able to rotate-oscillate the third lunar shaft (300) in an independent manner; -first actuator means (M1); -second actuator means (M2); -synchronizer means (90).



DescriptionField of the Invention**[0001]**

- The present invention concerns a rotating system to withdraw, to transport and to supply blanks.
- More in particular, the present invention concerns a rotating system to withdraw blanks in proximity of the downstream end of a collection store, to transport said blanks towards a grasping conveyor, and to feed the same blanks above e/o against said conveyor while its relative transport belt moves in a determined direction with a determined linear transport speed.

Backgrounds of the Invention**[0002]**

- Currently the known rotating systems to withdraw, to transport and to feed blanks, see for example patent FR-2.487.31 0, have a series of drawbacks.
- A first drawback is due to the fact that said known systems are not able to execute a rapid change of size with regards to the forms and/or to the dimensions of the blanks, and regarding the execution of the operations of withdrawal, of transport, and of feeding of the blanks.
- A second drawback is due to the fact that through said known systems, when the grasping means (for example the suction cups) contact the blank for the grasping, said grasping means execute tangential movements, with consequent disagreeable relative movement (sliding) between said grasping means and the blank.
- A third drawback is due to the fact that through said known systems, when the grasping means (suction cups) extract the blank from the collective store, said

[0003] grasping means perform tangential movements, with consequential difficulties or defective extraction of the blank from the store.

- A fourth drawback is due to the fact that through said known systems, when the grasping means (for example the suction cups) transport the blank from the collecting zone towards the zone of release, the tail of the same blank interferes with the downstream end of the store or with other organs of the system, with consequent damage and/or folding and/or bending of the blank and/or separation/detachment of the grasping means and/or other malfunctions.
- A fifth drawback is due to the fact that through said known systems, when the grasping means (for example the suction cups) feed the blank above or against or along the moving grasping conveyor, as

for example above or against or along a rectilinear moving suction belt, said grasping means move the blank along a circular path with a tangential speed with is different with respect to the linear speed of the suction belt, with consequent disagreeable relative movements (sliding) between the blank and the suction belt.

- A sixth drawback is due to the fact that through said known systems, when the grasping means (for example suction cups) feed the blank above or against the moving conveyor, as for example above or against or along a moving suction belt, said grasping means don't allow to obtain a parallel positioning of the blank with respect to the rectilinear plane of the conveyor, i.e. with respect to the rectilinear plane configured by the suction belt.

Object of the Invention**[0004]**

- The scope of the present invention is therefore to resolve the above mentioned drawbacks.
- The invention, which is characterized by the claims, resolves the problem to create a rotating system to withdraw, to transport and to supply blanks, in which said system is characterized by the fact that it comprises: >-two rotating elements which are disposed opposite one another and spaced among them; >-a first solar shaft act to support and rotate said two rotating elements; >-a first planetary shaft and a second planetary shaft disposed coaxial among them, in which said first and said second planetary shafts are disposed parallel and radially spaced with respect to said first solar shaft, in which said first and said second planetary shafts are supported in a rotating manner by said first and said second rotating elements, in which said first and said second planetary shafts are designed to move along a circular orbit around said first solar shaft; >-two first arms, in which said two first arms extend with radial orientation with respect to said first and respectively to said second planetary shafts, in which said two first arms have two respective proximal portions respectively fixed on said first and second planetary shafts; >-a third lunar shaft, in which said third lunar shaft is supported in a rotating manner by respective distal portions of the respective two first arms; >-one or more second arms, in which said one or more second arms extend with radial orientation with respect to said third lunar shaft, in which said one or more second arms have proximal portions fixed on said third lunar shaft; >-one or more gripper means, in which said one or more gripper means are supported in proximity of the distal portions of said one or more second radial arms; >-first transmission means, in which said first transmission means are able to rotate said first and said second planetary shafts in the

same direction with respect to their axis, in relationship of phase with respect to the rotation and to the angular positions of the two rotating elements; >-second transmission means, in which said second transmission means are able to rotate-oscillate the third lunar shaft in independent manner with respect to the rotation and with respect to the angular positions of the two rotating elements and in an independent manner with respect to the rotation and with respect to the angular positions of the two planetary shafts; >-first actuator means able to rotate said first solar shaft; >-second actuator means able to rotate-oscillate said third lunar shaft by said second transmission means; >-synchronizer means able to synchronize said first and said second actuator means.

Brief description of the Drawings

[0005]

- Further features and advantages of the present invention will become more readily apparent from the following detailed description of an embodiment of the invention, described here purely by way of example without limitation, and described with reference to the enclosed drawing in which:
 - Figure 1 is a schematically front view of the system object of the present invention with some sectioned parts;
 - Figure 2 is a view from left towards right side with reference to fig. 1 and able to show schematically the first transmission means of the system object of the present invention;
 - Figure 3 is view from left towards right side with reference to fig. 1 and able to show schematically the second transmission means of the system object of the present invention;
 - Figures from 4A to 4H illustrate an example of modus operandi of the system object of the present invention.

Description of the Preferred Embodiment

[0006]

- With reference to the figures 1, 2 and 3, in the illustrated embodiment, the system is able to withdraw, to transport and to feed blanks and it comprises two orbiting gripper units, G1 and G2, substantially and functionally identical among them, as better comprehensible hereinafter, in which said gripper units G1 and G2 are arranged in an opposed manner among them.
- In such context, the rotating system can include one or two or three or more gripper units, G1, G2, etc., having the same modus operandi, without going out from the inventive concepts protected through the

present invention.

- With reference to the description, will be hereinafter described in a detailed manner the first orbiting gripper unit G1 only and, with reference to the second orbiting gripper unit G2, it will be described in a synthetic manner, using for similar elements the same numbers of the first gripper unit G1 with a different suffix.
- With reference to the first orbiting gripper unit G1 and to the figures 1, 2 and 3, the system to withdraw, to transport and to feed blanks comprises: >-two rotating elements 10 and 20; >-a first solar shaft 100; >-a first planetary shaft 210a and a second planetary shaft 210b; >-two first arms 30a and 30b; >-a third lunar shaft 300; >-one or more second arms 40a, 40e, 40b; >-one or more gripper means 50a, 50e, 50b; >-first transmission means 60a-60b; >-second transmission means 70a; >-first actuator means M1; >-second actuator means M2; >-synchronizer means 90;
- The two rotating elements 10 and 20 are disposed opposite one another and are axially spaced among them with the purpose to support the two orbiting gripper units G1 and G2.
- The first solar shaft 100 is able to support and to rotate said two rotating elements 10 and 20 and, as hereinafter described, the opposite ends of said solar shaft 100 are supported by the frame T.
- The first planetary shaft 210a and the second planetary shaft 210b are disposed coaxial among them configuring a relative planetary axis 200x.
- The same two planetary shafts 210a and 210b are disposed parallel and radially spaced with respect to said first solar shaft 100, and they are supported in their central zone in a rotating manner by said first 10 and said second 20 rotating elements, with the purpose to move said two planetary shafts 201 a and 210b along a circular orbit P200 (see fig. 2 and 3) around said first solar shaft 100 by the rotation of the two rotating elements 10 and 20.
- The two first arms 30a and 30b extend with radial orientation with respect to said first 210a and respectively to said second 210b planetary shafts, in which said two first arms 30a, 30b have two respective proximal portions, 31 a and 31 b, respectively fixed on said first 210a and on said second 210b planetary shafts.
- The third lunar shaft 300 is supported in rotating manner by respective distal portions 32a and 32b of the respective two first arms 30a and 30b.
- The second arms 40a, 40e, 40b extend with radial orientation with respect to said third lunar shaft 300, and they have proximal portions 41 a, 41 e, 41 b, fixed on said third lunar shaft 300 and, preferably, see fig. 2, they are fixed to said third lunar shaft 300 in a way offset with respect to the axis 300x of oscillation-rotation of said lunar shaft 300, with a tangential positioning with respect to said axis 300x of ro-

tation-oscillation.

- The gripper means 50a, 50e, 50b, are supported in proximity of the distal portions 42a, 42e, 42b by said one or more second radial arms 40a, 40e, 40b.
- The first transmission means 60a-60b are able to rotate said first 210a and said second 210b planetary shafts in the same direction with respect to their axis 210ax and 210bx, as well as in relationship of phase with respect to the rotation and to the angular positions of the two rotating elements 10 and 20.
- The second transmission means 70a are able to rotate-oscillate the third lunar shaft 300 in an independent manner with respect to the rotation and with respect to the angular positions of the two rotating elements 10 and 20, as well as in an independent manner with respect to the rotation and with respect to the angular positions of the two planetary shafts 210a and 210b.
- The first actuator means M1 are able to drive said first solar shaft 100 and they can assume various configurations.
- The second actuator means M2 are able to drive said second transmission means (70a).
- The synchronizer means 90 able to synchronize said first M1 and said second M2 actuator means, or to control said second M2 actuator means as best comprehensible described hereinafter.
- Likewise in comparison with all above described, the second opposed orbiting gripper unit G2 comprises:
 - >-the two rotating elements 10 and 20, >-the first solar shaft 100; >-two planetary shafts 201 c and 210d supported to move along the circular orbital path P-200; >-one or more first arms 30c and 30d having a proximal portion 31 c and 31 d respectively fixed on the planetary shafts 210c and 210d; >-a third lunar shaft 300-2 supported in rotating manner by a distal portion 32c and 32d of said one or more first arms 30c and 30d; >-one or more second arms 40c-40f-40d having a proximal portion 41c-41f-41d fixed to said third lunar shaft 300-2; >-one or more gripper means 50c-50f-50d supported in proximity of the distal portions 42c-42f-42d of said one or more second radial arms 50c-50f-50d; >-first transmission means 60c-60d able to rotate the second planetary shafts 210c and 210d; >-second transmission means 70c able to oscillate-rotate the third lunar shaft 300-2 in an independent manner with respect to the rotation of the two rotating elements 10 and 20 and in an independent with respect to the rotation of the two planetary shafts 210c and 210d; >-first actuator means M1; >-second actuator means M2; >-synchronizers means 90.
- With reference to the two rotating elements, 10 and 20, preferably, see figs 2 and 3, they comprise two plates supported by the first shaft 100, driven to rotate in the same direction with respect to a respective central axis, 10x and 20x, in which said axis 10x and 20x are coaxial with respect to the first axis 100x of

the first solar shaft 100.

- With reference to said first solar shaft 100 it is driven in rotation by the first actuator means M1 and it is supported in rotating manner by the frame T, as, for example, through a sleeve-pulley 71, better described hereinafter, and by a coaxial engagement with a shaft M1a that acts as a support, in which said shaft M1a is associated with the servomotor M1, in which said servomotor M1 is fixed to the frame T.
- The first planetary shaft 210a is supported in a rotating manner by the first rotating element 10 and, more in particular, it is supported in a rotating manner preferably by an rotating engagement with a first sleeve 81 a, in which said sleeve 81 a is supported in a rotating manner by a rotating engagement by the rotating element 10.
- The second planetary shaft 210b is supported in a rotating manner by a rotating engagement by the second rotating element 20.
- The first planetary shaft 210a and the second planetary shaft 210b have their respective axis 210ax and 210bx axially aligned among them, configuring in this manner a second planetary axis 200x.
- Furthermore, for reasons that will result subsequently, said first planetary shaft 210a and said second planetary shaft 210b are positioned axially spaced, with the purpose to form an aperture 230 among them, in which said aperture 230 has such a dimension able to allow the free passage of said one or more second arms 40a, 40e, 40b through said aperture 230.
- The first transmission means 60a-60b are able to rotate the first planetary shaft 210a and the second planetary shaft 210b together, in the same direction of rotation, in relationship of phase with respect to the rotation of the two rotating elements 10 and 20, with a so-called epicycloidal rotation.
- Said first transmission means 60a-60b comprise two separate transmission units, 60a and 60b, in which the first transmission unit 60a is able to rotate the first planetary shaft 210a, and the second transmission unit 60b is able to rotate the second planetary shaft 210b.
- The first transmission unit 60a is positioned along the external side of the first rotating element 10 and, for example, said first transmission unit 60a comprises:
 - >-a first solar gear wheel 61 a supported by the frame T; >-a second idle gear wheel 62a, in which said second wheel 62a is in mesh with said first solar gear wheel 61 a, in which said idle gear wheel 62a is supported in a rotating manner by a pin 63a, in which said pin 63a is supported by the first rotating element 10; >-a third gear wheel 64a, in which said third wheel 64a is in mesh with said second gear idle gear wheel 62a, in which said third gear wheel 64a is supported and fixed by an end portion 211a with said first planetary shaft 210a.
- The second transmission unit 60b is positioned along

- the external side of the second rotating element 20 and, for example, said second transmission unit 60b comprises: >-a first solar gear wheel 61 b supported by the frame T; >-a second idle gear wheel 62b, in which said second wheel 62b is in mesh with said first solar gear wheel 61 b, in which said idle gear wheel 62b is supported in a rotating manner by a pin 63b, in which said pin 63b is supported by the second rotating element 20; >-a third gear wheel 64b, in which said third wheel 64b is in mesh with said second idle gear wheel 62b, in which said third gear wheel 64b is supported and fixed by an end portion 211 b with said second planetary shaft 210b.
- Likewise, with reference to the opposed orbiting gripper unit G2, there are first transmission means 60c and 60d which are able to rotate the opposite first 210c and second 210d planetary shafts by two separate transmission means 60c and 60d.
 - The first transmission means 60c, in a similar manner with respect to the analogous transmission means 60a, comprise: the gear wheel 61 a, a second gear wheel 62c, a pin 63c, a third gear wheel 64c supported and fixed to the planetary shaft 210c.
 - The second transmission means 60d, in a similar manner with respect to the analogous transmission means 60b, comprise: the gear wheel 61 b, a second gear wheel 62d, a pin 63d, a third gear wheel 64d supported and fixed to the planetary shaft 210d.
 - With reference to said second transmission means 70a regarding the first orbiting gripper unit G1 they preferably comprise: >-a first pulley 71 a, in which the axis of rotation 71 x coaxial with respect to the first axis 100x; >-a second pulley 72a, in which said second pulley 72a is fixed on an end portion 82a of a sleeve 81 a, in which said end portion 82a is positioned to the external side with respect to the rotating element 10, in which said sleeve 81 a is supported in a rotating manner by the first rotating element 10; >-a first transmission belt 73a wound on said first pulley 71 a and on said second pulley 72a; >-a third pulley 74a, in which said third pulley 74a is fixed on an end portion 83a of said sleeve 81 a, in which said end portion 83a is positioned to the internal side with respect to the rotating element 10; >-a fourth pulley 75a, in which said fourth pulley 75a is fixed on a second sleeve 85a, in which said second sleeve 85a is supported in rotating manner by a rotating engagement in proximity of the distal portion 32a of the first radial arm 30a; >-a second transmission belt 76a wound on said third pulley 74a and on said fourth pulley 75a; in which said first pulley 71 a is operated in oscillation-rotation through said second actuator means M2, in which said second actuator means M2 is positioned to the exterior with respect to the rotating system and supported by the frame T.
 - Likewise, with reference to the opposed orbiting gripper unit G2, the opposed second transmission means 70c comprise: >-the first pulley 71a above mentioned, >-a second pulley 72c, in which said second pulley 72c is fixed on an end portion 82c of a sleeve 81 c, in which said end portion 82c is positioned to the external side with respect to the rotating element 10, in which said sleeve 81 c is supported in a rotating manner by the first rotating element 10; >-a first transmission belt 73c (in the embodiment illustrated said belt 73c is the belt 73a) wound on said first pulley 71 a and on said second pulley 72c; >-a third pulley 74c, in which said third pulley 74c is fixed on an end portion 83c of said sleeve 81 c, in which said end portion 83c is positioned to the internal side with respect to the rotating element 10; >-a fourth pulley 75c, in which said fourth pulley 75c is fixed on a second sleeve 85c, in which said second sleeve 85c is supported in rotating manner by a rotating engagement in proximity of the distal portion 32c of the first radial arm 30c; >-a second transmission belt 76c wound on said third pulley 74c and on said fourth pulley 75c.
 - With reference to the embodiment of fig. 1, the first pulley 71 a is associated with a sleeve-pulley 71, in which said sleeve-pulley has a form as a cup element 71, in which said cup element 71 is supported in a rotating manner by the frame T, in which said sleeve-pulley 71 supports to its inside in a rotating manner the left free end of the first shaft 100.
 - With reference to the illustrated embodiment, the second transmission means 70a and 70c further comprise a respective idle rolls 77a and 77c supported by a respective pin 78a and 78c, in which said pins 78a and 78c are fixed to the first rotating element 10, as well as other similar other rolls illustrated in this embodiment, in which said rollers are able to configure the path of the belts.
 - With reference to the first rotating group G1, the first sleeve 81 a supports internally in a rotating manner the second planetary shaft 210a by a rotating engagement, and the second sleeve 85a supports internally in a rotating manner the third lunar shaft 300 while, on the opposed side, the second planetary shaft 210b is supported in a rotating manner by the second rotating element 20 by a rotating engagement and the third shaft 300 is supported in a rotating manner by the free end 32b of the arm 30b by a rotating engagement.
 - With reference to the first actuator means M1 and to the second actuator means M2, they comprise two separate servomotors, as for example two brushless servomotors, positioned in a fixed manner at the exterior of the two rotating element 10 and 20 and fixed to the frame T.
 - With reference to the synchronizers means 90, they preferably comprise a programmable control unit (CPU or similar) able to control the rotation of said two servomotors M1 and M2.
 - In a variant of the illustrated embodiment, the first actuator means M1 may be obtained by a mechan-

ical connection with an operating machine, as for example by a mechanical connection with a packaging machine, with the purpose to obtain the rotation of the two rotating elements 10-20 in relationship of phase with the operative cycle of the packaging machine and, the second actuator means, M2, can comprise a brushless servomotor M2.

- In this case, the control unit 90 executes the control of the second servomotor M2 on the base of the angular positions of the rotating elements 10 and 20 and, for such embodiment, preferably, the system further comprises a sensor of angular position, so called encoder, in which said sensor is able to detect the angular positions of the first shaft 100 and, therefore, the angular positions of the two rotating elements 10 and 20, in which said encoder is connected with the synchronizing means or with the programmable control unit 90 with the purpose to transmit to this control unit 90 the relative signals regarding the angular positions.
- With reference to the above description and to figure 4A, it is evident that by the operating of the first actuator means M1 the shaft 100 and the associated rotating elements 10 and 20 are conducted in rotation, for example in clockwise rotation, W100, with consequent anti-clockwise epicyclic rotation, W200, of the two planetary shafts 210a and 210b and of the relative arms 30a and 30b, in which the angular speed of the anti-clockwise epicycloidal rotation W200 is determined by the transmission relationship between the wheels of the first transmission means 60a-60b, while, with reference to the oscillation-rotation of the lunar shaft 300 and, therefore, with reference to the rotation-oscillation of the second arms 40a-40e-40c, said rotation-oscillation of the shaft 300 can be freely selected with reference to the two directions, W300sx or W300dx, as well as also freely selected/adopted with reference to the angular speed, in which said direction and said angular speed can be freely changed and/or freely varied during the rotation of the two rotating elements 10 and 20.

Esemplificative Operation

[0007]

- With reference to the figures from 4A to 4H they show an non limitative example of *modus operandi* of the system object of the present invention in which, in the illustrated case, the rotating system, by a specific software recorded into the control unit 90 is able to control the two servomotors M1 and M2, executing some operations as to withdraw from a store 400 a blank, to transport the blank withdrawn towards a conveyor, and to feed the same blank above-against the conveyor 500 having a suction belt type, in which said operations are executed by moving the gripper

means 50a-50e-50b along a determined path P50 better described hereinafter, in which said operations are executed adopting same particular orientations for the grasping plane of the gripping means (i.e. for the grasping plane of the suction cups) 50a-50e-50b during the movement along said path 50.

- With reference to the above structural description, through the driving of the motor M1, the shaft 100 and the associated rotating elements 10 and 20 are driven in a clockwise rotation, W100, preferably with continuous motion, with consequent driven in anti-clockwise epicycloidal rotation W200 of the two planetary shafts 210a and 210b and of the relative arms 30a and 30b.
- With reference to the figures from 4A and 4B, during the operations of contact and of grasping of the blank Fa, through driving of the motor M2, the angular rotation W300 of the shaft 300 is varied in a manner able to obtain with reference to the gripper means 50a-50e-50b a substantially radial movement, see segment AB of the path P50 and, furthermore, during the phase of contact of the blank Fa, see point C of the path 50, said gripper means 50a-50e-50f have tangential speed equal to zero, with consequent absence of relative movement (i.e. absence of sliding) between the blank Fa and the gripper means 50a-50e-50b.
- With reference to the figures from 4C and 4D, during the operations of extraction of the blank Fa from the store 400, through driving of the servomotor M2, the angular speed rotation W300 of the shaft 300 is varied in a manner to obtain with reference to the gripper means 50a-50e-50b a substantially radial movement, see segment BC of the path P50.
- With reference to the figures from 4E to 4F, during the operations of transport of the blank Fa towards the conveyer 500, through driving of the motor M2, the angular rotation W300 of the shaft 300 is varied in a manner able to obtain with reference to the gripper means 50a-50e-50b a movement/inclination able to avoid interference between the tail Fac of the blank Fa and the successive blank Fb which is positioned into the store 400.
- With reference to the figures from 4G to 4H, during the operations of feeding the blank Fa against the belt 501 of the conveyer 500, through driving of the motor M2, the angular rotation W300 of the shaft 300 is varied in manner to obtain with reference to the gripper means 50a-50e-50b, a parallel disposition between the blank Fa and the grasping plain configured by the grasping belt 501, and, in this manner, move the blank Fa towards and against the suction belt 501 and, at the same time, preferably, with reference to the blank Fa, execute a linear advancement with a linear speed equal to the linear speed of said suction belt 501.
- With reference to the figures from 4F to 4G, during the operations of transport and feeding of the blank

Fa said one or more second arms 40a, 40e, 40b are moved in such way able to pass through the aperture 230.

- The descriptions of the aforementioned system and modus operandi are given purely as an example and are not to be considered a restriction and, therefore, it is obvious that suggested modifications and/or variations could be made to them during their practice and/or by their use, anyways within the scope of the following claims.
- In such context, these following claims also form an integral part of the description stated above.

Claims

1. Rotating system to withdraw, to transport and to supply blanks, **characterized by the fact** to comprises: >-two rotating elements (10, 20) which are disposed opposite one another and spaced among them; >-a first solar shaft (100) act to support and rotate said two rotating elements (10, 20); >-a first planetary shaft (210a) and a second planetary shaft (210b) disposed coaxial among them (200x), in which said first (210a) and said second (210b) planetary shafts are disposed parallel and radially spaced with respect to said first solar shaft (100), in which said first (210a) and said second (210b) planetary shafts are supported in a rotating manner by said first (10) and said second (20) rotating element, in which said first (210a) and said second (210b) planetary shafts are designed to move along a circular orbit (P200) around said first solar shaft (100); >-two first arms (30a, 30b), in which said two first arms (30a, 30b) extend with radial orientation with respect to said first (210a) and respectively to said second (210b) planetary shafts, in which said two first arms (30a, 30b) have two respective proximal portions (31 a, 31 b) respectively fixed on said first (210a) and second (210b) planetary shafts; >-a third lunar shaft (300), in which said third lunar shaft (300) is supported in rotating manner by respective distal portions (32a, 32b) of the respective two first arms (30a, 30b); >-one or more second arms (40a, 40e, 40b), in which said one or more second arms (40a, 40e, 40b) extend with radial orientation with respect to said third lunar shaft (300), in which said one or more second arms (40a, 40e, 40b) have proximal portion (41 a, 41 e, 41 b) fixed on said third lunar shaft (300); >-one or more gripper means (50a, 50e, 50b), in which said one or more gripper means (50a, 50e, 50b) are supported in proximity of the distal portions (42a, 42e, 42b) of said one or more second radial arms (40a, 40e, 40b); >-first transmission means (60a-60b), in which said first transmission means (60a-60b) are able to rotate said first (210a) and said second (210b) planetary shafts in the same direction with respect to their axis (210ax, 210bx), in relation-

ship of phase with respect to the rotation and to the angular positions of the two rotating elements (10, 20); >-second transmission means (70a), in which said second transmission means (70a) are able to rotate-oscillate the third lunar shaft (300) in independent manner with respect to the rotation and with respect to the angular positions of the two rotating elements (10, 20) and in an independent manner with respect to the rotation and with respect to the angular positions of the two planetary shafts (210a, 210b); >-first actuator means (M1) able to rotate said first solar shaft (100); >-second actuator means (M2) able to rotate-oscillate said third lunar shaft (300) by said second transmission means (70a); >-synchronizer means (90) able to synchronize said first (M1) and said second (M2) actuator means.

2. System according to claim 1, **characterized by the fact that** said first planetary shaft (210a) and said second planetary shaft (210b) are axially spaced with the purpose to form an aperture (230) and **by the fact that** said one or more second arms (40a, 40e, 40b) are designed to move through said aperture (230).
3. System according to one of the previous claims, **characterized for the fact that** said first transmission means (60a-60b) comprise a first transmission unit (60a) and a second transmission unit (60b), and **by the fact that** the first transmission unit (60a) is able to rotate the first planetary shaft (210a) and the second transmission unit (60b) is able to rotate the second planetary shaft (210b).
4. System according to one of the previous claims, **characterized by the fact that** said first (60a) or said second (60b) transmission unit comprises: >-a first solar wheel (61a/61b); >-a second wheel (62a/62b) supported (63a/63b) in a rotating manner through said rotating element (10/20), in which said second wheel (62a/62b) is in mesh with said first solar wheel (61a/61b); >-a third wheel (64a/64b) supported and fixed to said first or second planetary shaft (210a/210b), in which said third wheel (64a/64b) is in mesh with said second wheel (62a/62b).
5. System according to one of the previous claims, **characterized by the fact that** said second transmission means (70a) are able to connect the third planetary shaft (300) with the second actuator means (M2) in an independent manner with respect to the other operational elements (M1, 100, 210a, 210b, 60a, 60b, etc.).
6. System according to one of the previous claims, **characterized by the fact that** said second transmission means (70) comprise: >-a first pulley (71 a), in which the axis of rotation (71x) of said first pulley

- is coaxial with respect to the first axis (100x); >-a second pulley (72a), in which said second pulley (72a) is fixed on a first sleeve of support (81 a), in which said first sleeve of support (81 a) is supported in a rotating manner by one (10) of said two rotating elements (10, 20); >-a first belt of transmission (73a) wound on said first (71 a) pulley and on said second (72a) pulley; >-a third pulley (74a), in which said third pulley (74) is fixed on said first sleeve of support (81 a); >-a fourth pulley (75a), in which said fourth pulley (75a) is fixed on a second sleeve of support (85a), in which said second sleeve of support (85a) is supported in rotating manner in proximity of the distal end (32a) of the first radial arm (30a); >-a second belt of transmission (76a) wound on said third (74a) pulley and on said fourth pulley (75a); and **by the fact that** said first pulley (71 a) is operated in oscillation-rotation through said second actuator means (M2).
7. System according to the claim 6, **characterized by the fact that** said first sleeve (81 a) supports internally the second planetary shaft (210a) in a rotating manner.
8. System according to the claim 6 or 7, **characterized by the fact that** said second sleeve (85a) supports internally the third lunar shaft (300) in a rotating manner.
9. System according to one of the claims from 6 to 8, **characterized by the fact that** said first pulley (71 a) comprises a cup element (71) supported by the frame (T) in which said cup element (71) supports to its inside in a rotating manner the free end of the first shaft (100).
10. System according to one of the previous claims, **characterized by the fact that** said first actuator means (M1) comprise a first servo-motor, **by the fact that** said second actuator means (M2) comprise a second servo-motor, and **by the fact that** said synchronizers mean (90) comprises a programmable control unit able to control the rotation of said two servo-motors (M1, M2).
11. System according to one of the claims from 1 to 11, **characterized by the fact that** said first actuator means (M1) comprise a mechanical connection with the cycle of an operative machine, **by the fact that** said second actuator means (M2) comprise a second servo-motor (M2), and **by the fact that** said synchronizer means (90) comprises a programmable control unit which is able to control the second servomotor (M2) on the base of the angular positions assumed by the rotating element (10, 20) and on the base of the angular positions assumed by the two planetary shafts (210a, 210b).
12. System according to one of the previous claims, **characterized by the fact that** the second arms (40a, 40e, 40b) have their proximal portion (41 a, 41 e, 41 b) fixed to said third lunar shaft (300) in way offset with respect to the axis of oscillation-rotation (300x) of the same lunar shaft (300).
13. System according to one of the previous claims, **characterized by the fact** to comprise: >-two gripper units (G1, G2) disposed opposite among them; >-two rotating elements (10, 20) which are disposed opposite one another and spaced among them; >-a first solar shaft (100) act to support and to rotate said two rotating elements (10, 20); >-a first couple of planetary shafts (210a, 210b) associated to the first gripper unit (G1); >-a second couple of planetary shafts (210c, 210d) associated to the second gripper unit (G2); >-a first couple of two first arms (30a, 30b) associated to the first gripper unit (G1); >-a second couple of two first arms (30c, 30d) associated to the second gripper unit (G2); >-a first third lunar shaft (300) associated to the first gripper unit (G1); >-a second third lunar shaft (300) associated to the second gripper unit (G2); >-a first plurality of one or more second arms (40a, 40e, 40b) associated to the first gripper unit (G1); >-a second plurality of one or more second arms (40c, 40f, 40d) associated to the second gripper unit (G2); >-a first plurality of one or more gripper means (50a, 50e, 50b) associated to the first gripper unit (G1); >-a second plurality of one or more gripper means (50c, 50f, 50d) associated to the second gripper unit (G2); >-a first unit of first transmission means (60a-60b) associated to the first gripper unit (G1); >-a second unit of first transmission means (60c-60d) associated to the second gripper unit (G2); >-a first unit of second transmission means (70a) associated to the first gripper unit (G1); >-a second unit of second transmission means (70c) associated to the second gripper unit (G2).
14. System according to one of the previous claims, **characterized by the fact that** the first solar shaft (100) performs a first angular rotation (W100) in a first direction, **by the fact that** the second planetary shafts (210a, 210b) perform a second angular rotation (W200) in a second direction (W200) opposite with respect to the first rotation (W100) and a angular rotation synchronized with respect to the rotation and to the angular position of the first solar shaft (100), and **by the fact that** the third lunar shaft (300) rotates-oscillates in independent manner with respect to the rotation and to the angular position of the first solar shaft (100) and in an independent manner with respect to the rotation and to the angular position to the second shaft (210a, 210b).
15. System according to one of the previous claims, **characterized by the fact that** during the rotation

of the two rotating elements (10, 20) said second actuator means (M2) provide to oscillate the third axis-shaft (300x-300) with the purpose to obtain with reference to the gripper means (50c, 50f, 50d) a substantially radial movement (AB/BC).

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16. System according to one of the previous claims, **characterized by the fact that** during the rotation of the two rotating elements (10, 20) said second actuator means (M2) provide to oscillate the third shaft (300) with the purpose to obtain with reference to the gripper means (50c, 50f, 50d) a movement able to obviate the interference between the tail (Fac) of the withdrawn blank (Fa) and subsequent blank (Fb) lodged into the store of collecting (400).

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17. System according to one of the previous claims, **characterized by the fact that** during the rotation of the two rotating elements (10, 20) said second actuator means (M2) provide to oscillate the third shaft (300) with the purpose to obtain with reference to the gripper means (50c, 50f, 50d) a rectilinear movement.

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Fig. 1

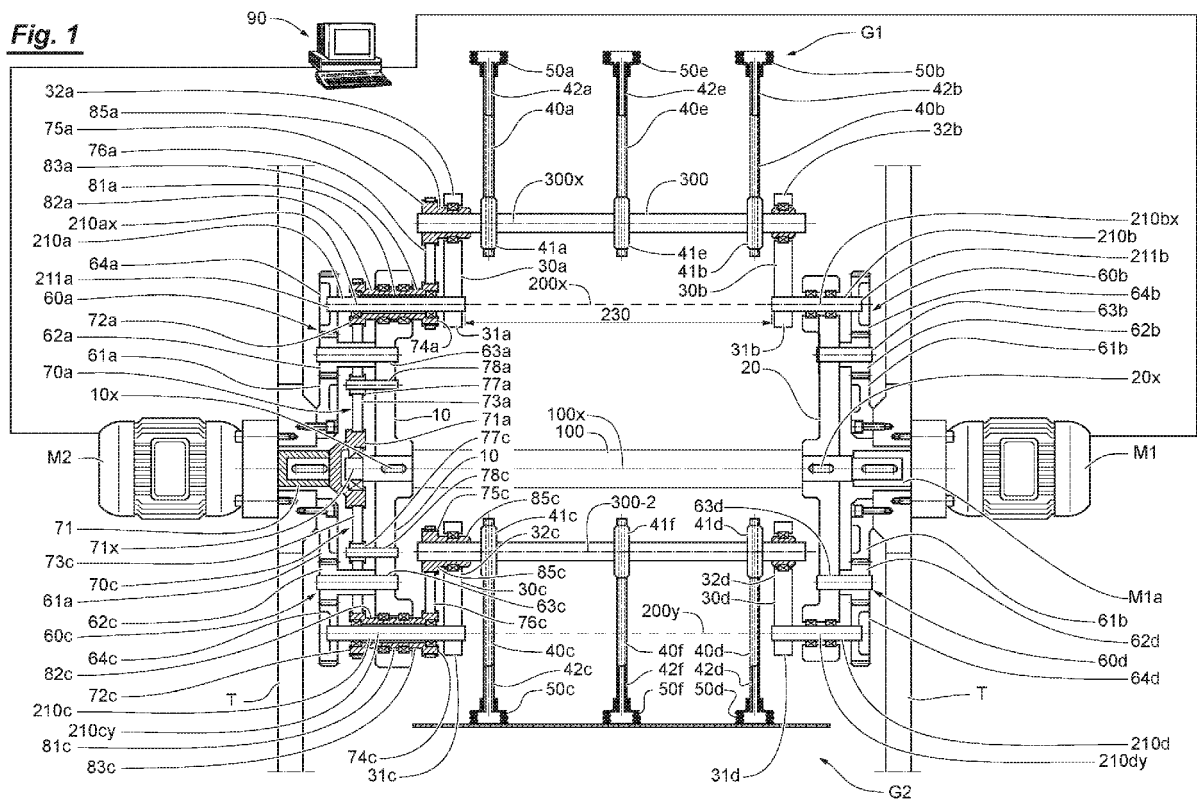


Fig. 2

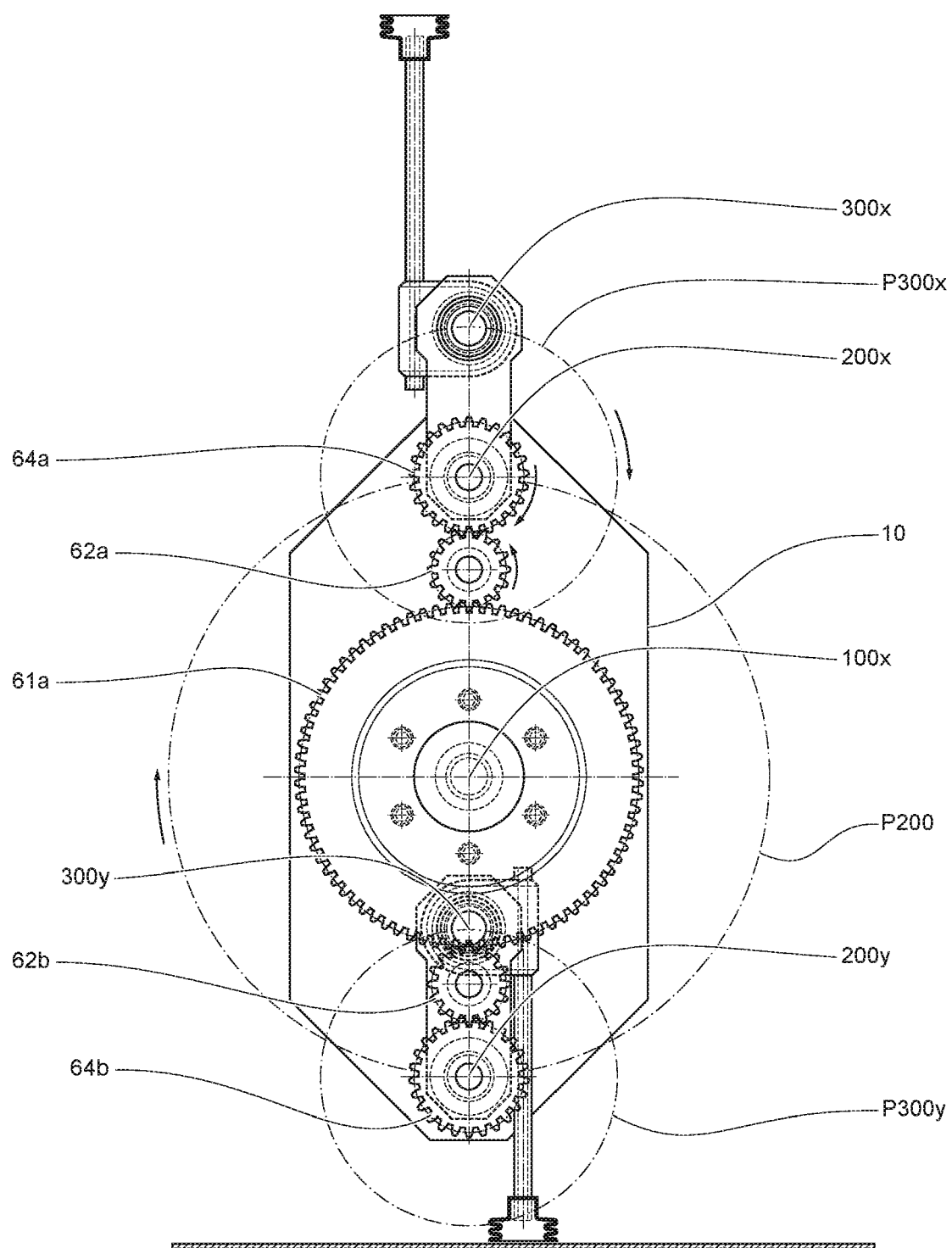


Fig. 3

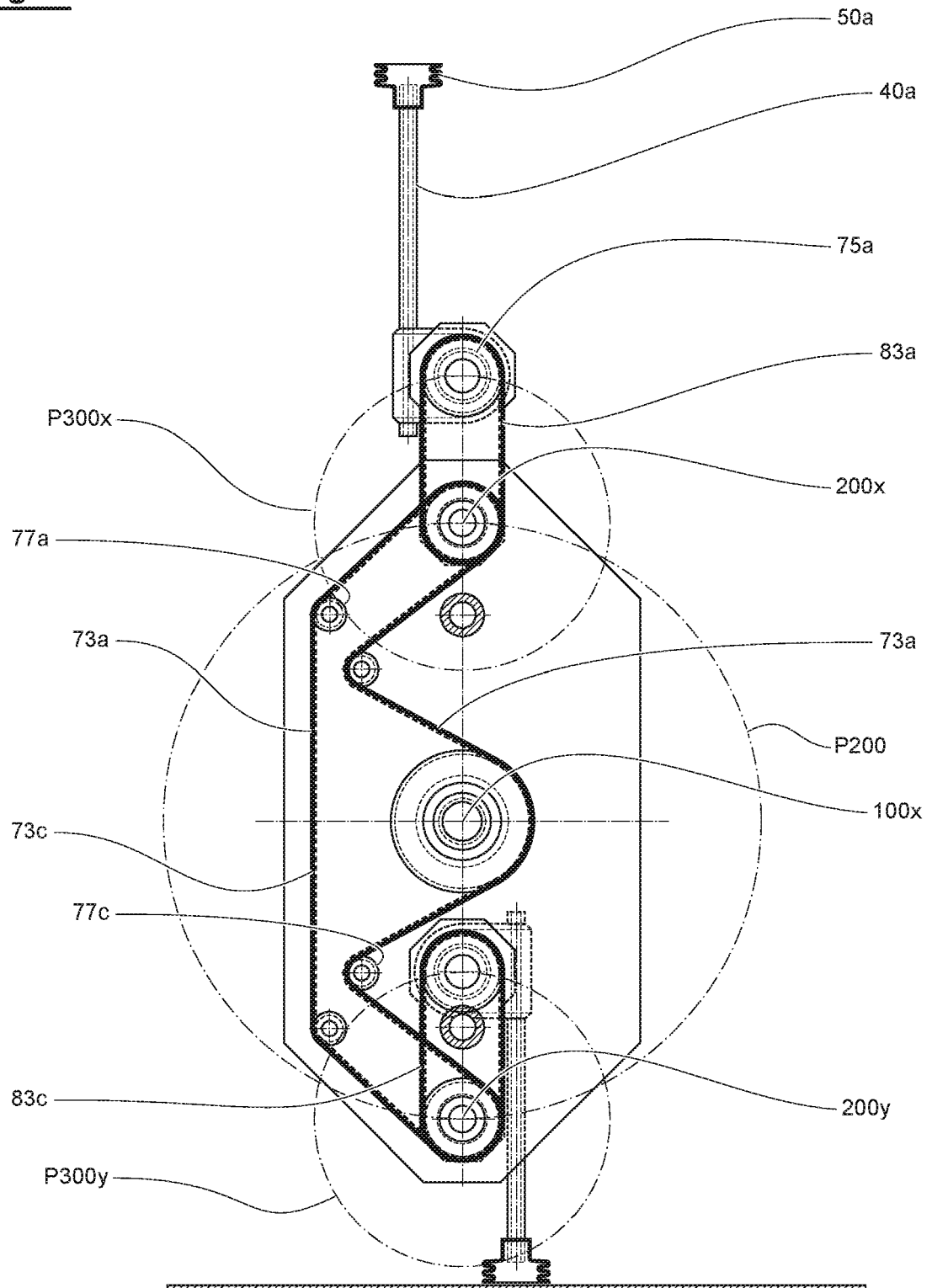


Fig. 4A

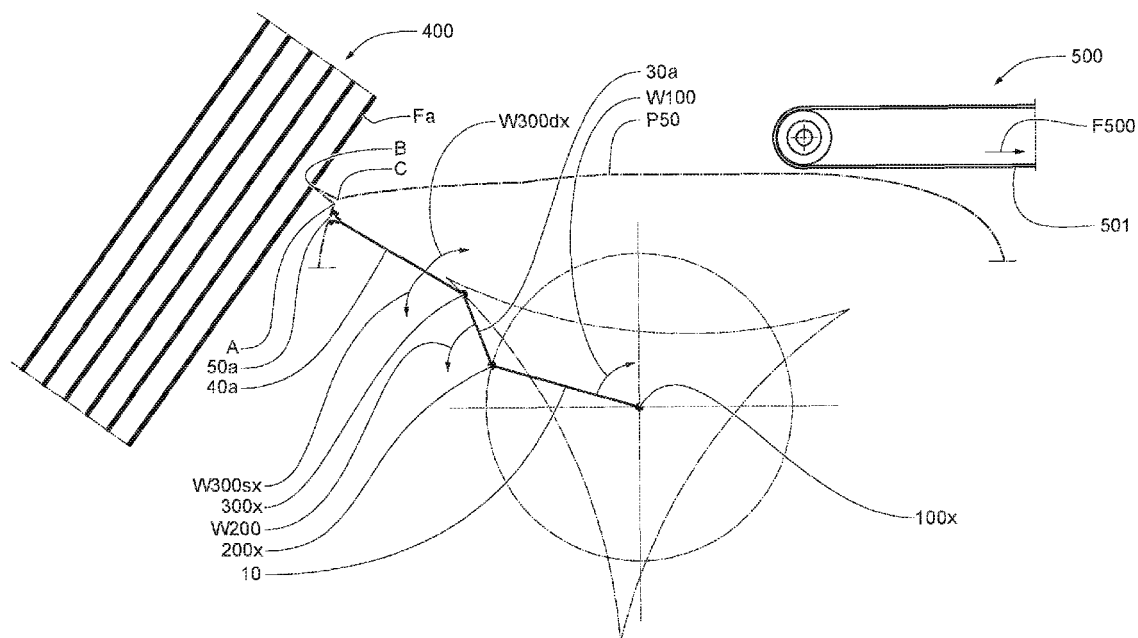


Fig. 4B

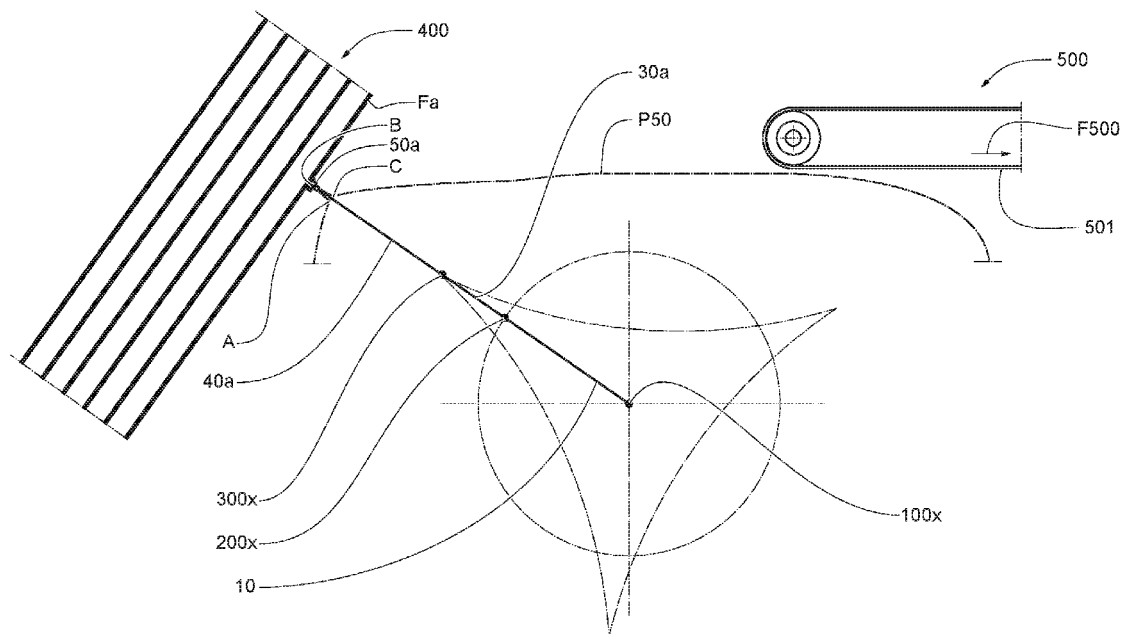


Fig. 4C

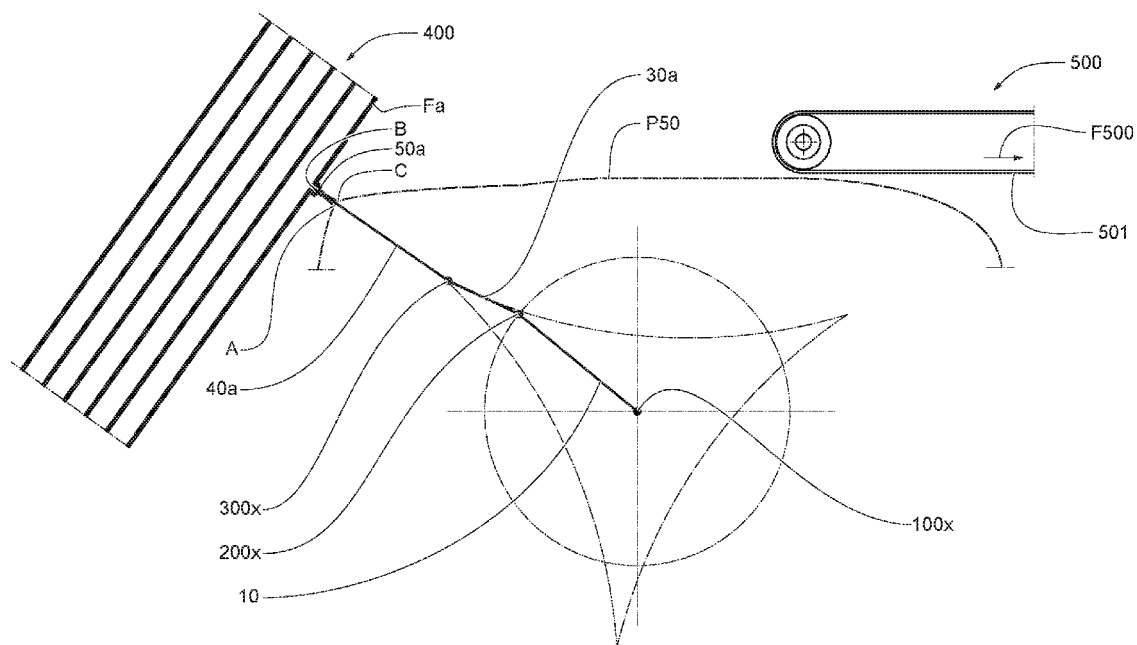


Fig. 4D

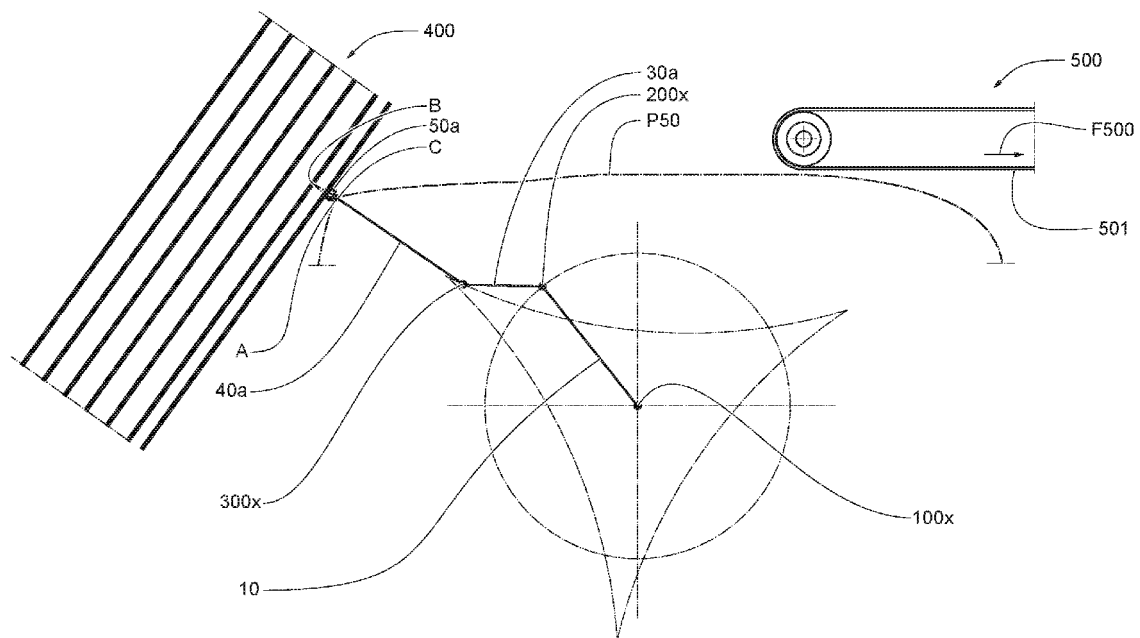


Fig. 4E

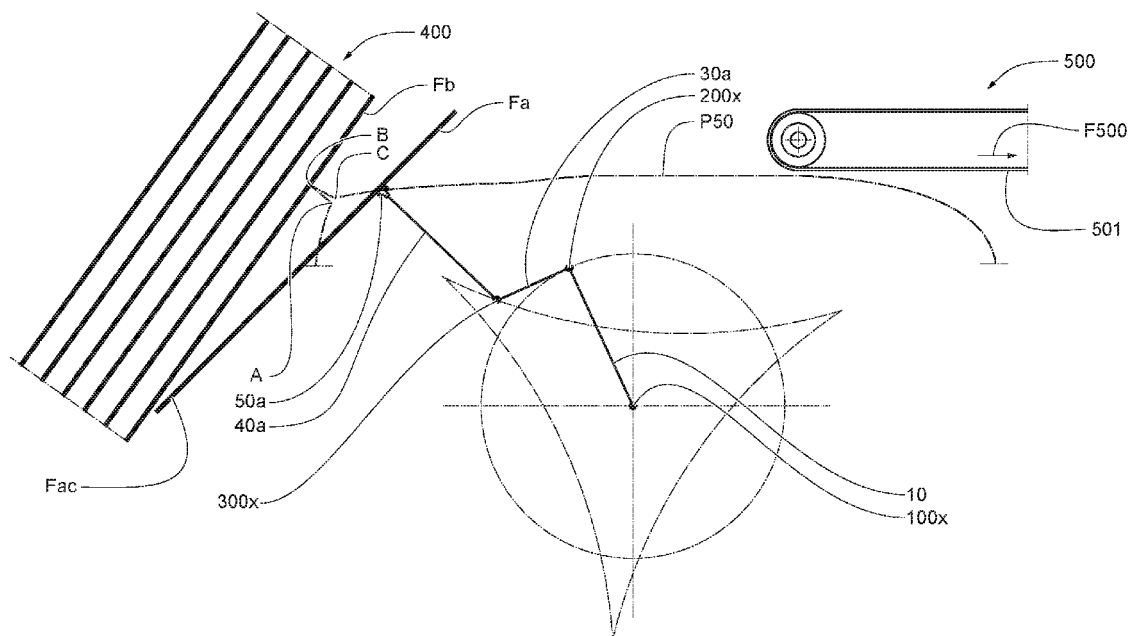


Fig. 4F

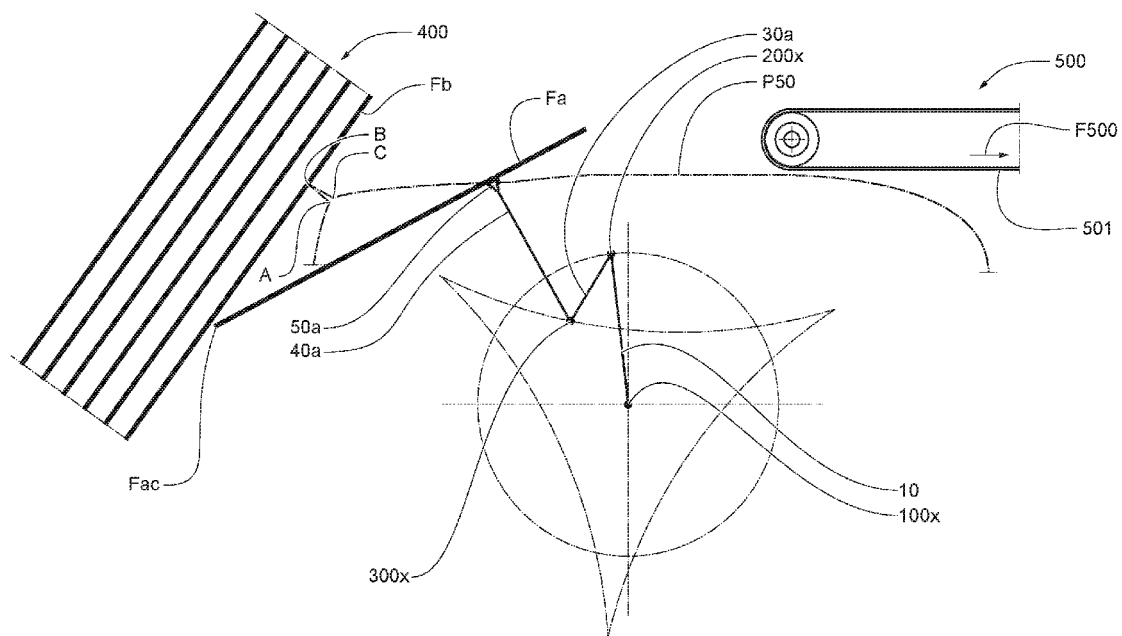


Fig. 4G

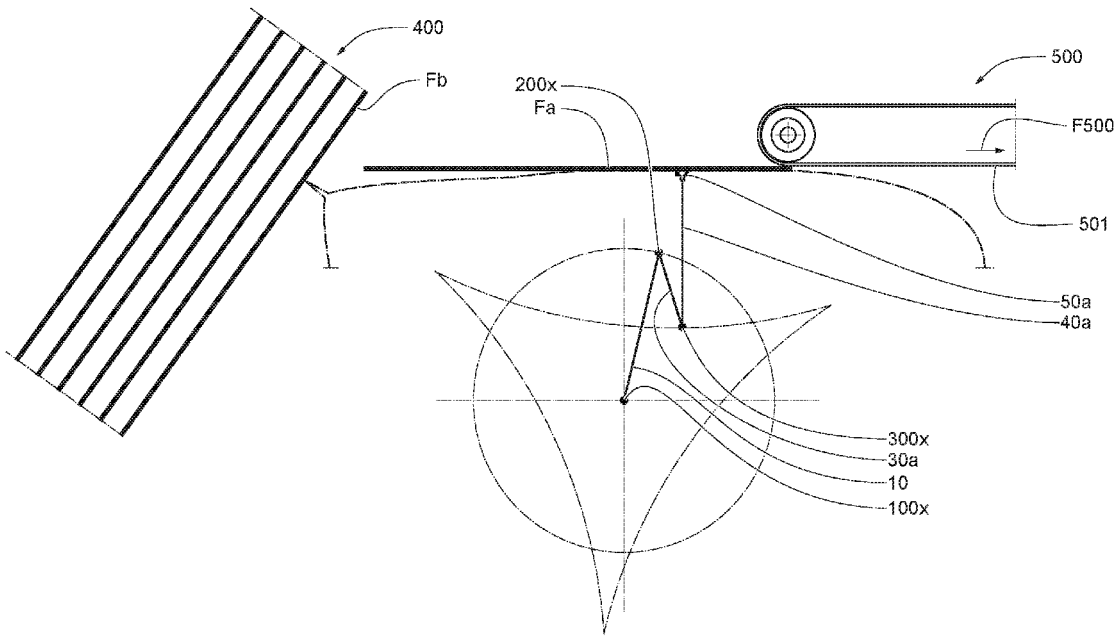
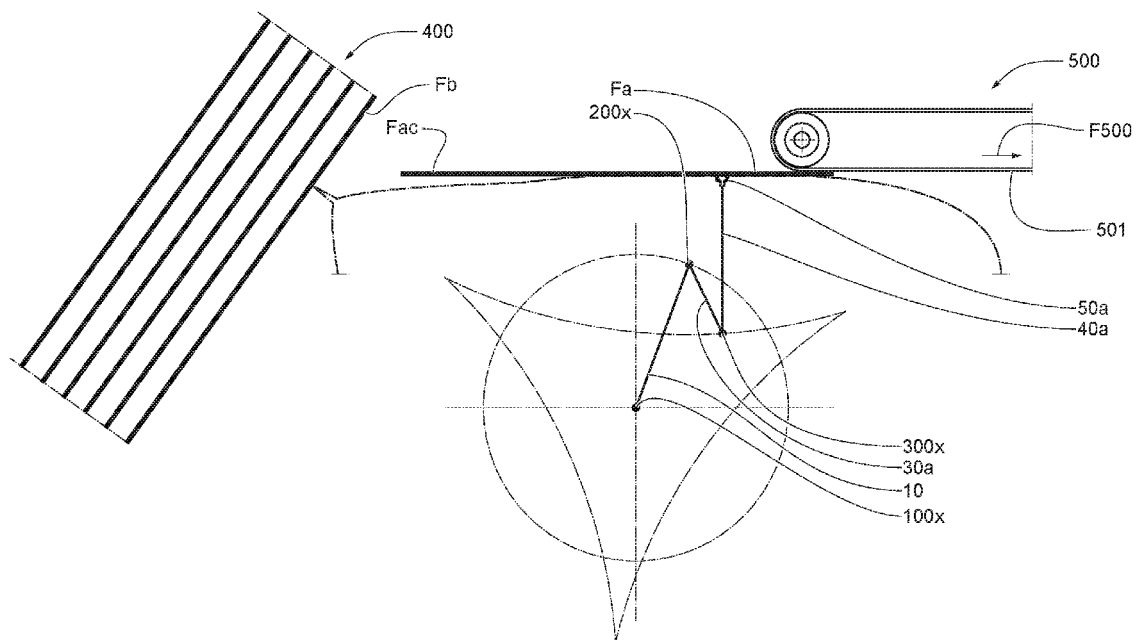


Fig. 4H





EUROPEAN SEARCH REPORT

Application Number
EP 11 18 1578

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	EP 0 374 556 A2 (UNILEVER NV [NL]; UNILEVER PLC [GB] 4 P NICOLAUS KEMPTEN GMBH [DE]) 27 June 1990 (1990-06-27) * column 2, line 30 - column 3, line 26; figures 1-4 *	1-17	
A	EP 1 770 030 A2 (BOSCH GMBH ROBERT [DE]) 4 April 2007 (2007-04-04) * paragraph [0019] - paragraph [0047]; figures 1-9 *	1-17	
A	FR 2 151 423 A5 (HAMADA PRINTING PRESS) 13 April 1973 (1973-04-13) * page 7, line 8 - page 10, line 30; figures 1-3 *	1-17	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65H B31B B65G
Place of search		Date of completion of the search	Examiner
The Hague		28 December 2011	Henningsen, Ole
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 11 18 1578

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28-12-2011

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